

REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1, 2 and 5-6 are presently active in this case, Claim 1 is amended and Claims 3 and 7-10 are cancelled by the present amendment.

In the outstanding Official Action, Claim 3 was objected to as including informalities; Claims 1-3, 5 and 6 are rejected under 35 U.S.C. §103(a) as unpatentable over Shinohara et al. (U.S. Pat. Pub. US2002/0132426, herein "Shinohara") in view of Engelhardt et al. (U.S. Pat. No. 6,730,562, herein "Engelhardt").

In light of the outstanding rejection on the merits, Claim 1 has been amended to clarify the claimed invention and thereby more clearly patentably define over the cited prior art. Support for the changes to Claim 1 is found, for example, in Figure 2D and the corresponding portion of the specification. Thus, no new matter has been added.

Briefly recapitulating, Claim 1 is directed to a method of manufacturing a semiconductor device equipped with a capacitor in which a dielectric film is used, wherein a conductive complex oxide having an exposed top surface is used as a mask material when the dielectric film is subjected to reactive ion etching, and the mask material, which is in direct contact with the dielectric film, is used as an upper electrode of the capacitor after the reactive ion etching is performed, an area of a top surface of the dielectric film being equal to an area of a bottom surface of the mask material after the reactive ion etching.

In a non-limiting example described in the present specification,<sup>1</sup> a hard mask (for processing of the upper electrode) 11 is formed as shown in FIG. 2B, and upper SRO electrode (which serves as both an upper electrode and a hard mask) 12 (conductive complex oxide) is subjected to RIE as shown in FIG. 2C. The hard mask 11 disappears when RIE is

---

<sup>1</sup> Present specification at page 23, line 12 to page 24, line 20.

performed. In other words, the top surface of the upper SRO electrode 12 is exposed. PZT film 13 (dielectric film) is subjected to RIE, using the pattern of the upper SRO electrode 12 as a mask (refer to FIG. 2D). As a result, the width of the upper SRO electrode 12 (which is the mask) defines the width of the PZT film 13, and the edge portions of the surface of the exposed upper SRO electrode 12 are etched. In other words, the area of the bottom of the upper SRO electrode 12 (which is the mask) is equal to the area of the top of the PZT film 13, as is shown in Figure 2D.

In contrast, in Shinohara, the area of the bottom surface of the upper electrode 13 is smaller than that of the top surface of the dielectric film 12 after etching, as is shown in Figure 2C of Shinohara. If the upper electrode is used as a mask for etching the dielectric film, as is done in the claimed invention, the area of the top surface of the dielectric film must be equal to that of the bottom surface of the mask material. Accordingly, Shinohara does not describe that the upper electrode is used as a mask for etching the dielectric film.

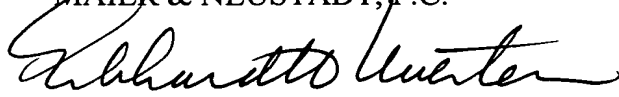
Engelhardt describes dry etching of an upper electrode and dielectric film. However, Engelhardt employs a mask 15 formed of an oxide or nitride and provided on the upper electrode. This differs from the mask material of the claimed invention which is formed of a conductive complex oxide having an exposed top surface and is used as the upper electrode. In addition, Engelhardt does not cure the deficiencies of Shinohara with respect to the feature recited in Claim 1 of an area of the top surface of the dielectric film must be equal to that of a bottom surface of the mask material.

Accordingly, Applicants respectfully submit that Claim 1 and claims depending therefrom patentably distinguish over Shinohara and Engelhardt considered individually or in any proper combination.

Consequently, in view of the present amendment and in light of the above comments, no further issues are believed to be outstanding, and the present application is believed to be in condition for allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.



---

Eckhard H. Kuesters  
Attorney of Record  
Registration No. 28,870

Customer Number  
**22850**

Tel: (703) 413-3000  
Fax: (703) 413 -2220  
(OSMMN 06/04)

I:\ATTY\JL\243433US\243433US\_AM(2.12.2007).DOC